

## A cosmological dark matter collider experiment

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Observations of dark matter structure at the smallest scales can tell us about physical processes taking place in the dark sector at very early times. Here, we point out that the presence of light degrees of freedom coupling to dark matter in the early Universe introduces a localized feature in the halo mass function. This leads to a mass function that is distinct in shape than either warm dark matter or cold dark matter, hence distinguishing these models from other leading classes of dark matter theories. We present analytical calculations of these mass functions and show that they closely match N-body simulations results. We briefly discuss how current constraints on the abundance of small-scale dark matter structure do not directly apply to these models due to the multi-scale nature of their mass function.

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